REMARKS

This paper is filed in response to the Office Action mailed on July 28, 2004. Presently, Claims 1-27 are pending in the application. Claim 1 has been amended. Reconsideration of Claims 1-27 is respectfully requested.

The Rejection of Claims 11 and 22 Under 35 U.S.C. § 112, Second Paragraph

Claims 11 and 22 are rejected under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential elements. The Examiner states:

> The claims at hand, refer to retaining a pulp in a "vessel," however, applicants' specification makes no mention of a vessel, but rather a bleaching tower. A vessel is a broad term that could refer to virtually anything, whereas a bleaching tower is an art-recognized apparatus. The claims should be amended to properly refer to a bleaching tower.

Applicants respectfully disagree. The specification makes reference to a vessel in numerous instances, for example, page 10, lines 8-14, provides adequate support for Claims 11 and 22. Accordingly, withdrawal of the rejection of Claims 11 and 22 is respectfully requested.

The Rejection of Claims 1, 2, 4, 5, 8, 10, and 16-21 Under 35 U.S.C. § 102(b)

Claims 1, 2, 4, 5, 8, 10 and 16-21 are rejected under 35 U.S.C. § 102(b) as being anticipated by Vincent et al. (U.S. Patent No. 6,056,853). Applicants respectfully disagree.

The Vincent reference is directed to a pulp bleaching process using magnesium oxide or magnesium hydroxide as a substitute for caustic soda, wherein the pulp is bleached in the presence of hydrogen peroxide. (See the Abstract.)

Claim 1 recites, "introducing a source of magnesium ions and hydroxyl ions to a refiner" and "introducing a source of perhydroxyl ions to said refiner." A refiner has a commonly accepted meaning in the art. Please refer to the attached Exhibit A, Christopher J. Biermann, The Handbook of Pulping and Papermaking, pages 142-145, for representative examples of refiners. The claimed invention is not limited to the examples or any one particular refiner. Furthermore, a "refiner" is defined in the specification at page 6, lines 21-24. The Vincent

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reference makes no mention of a refiner. For a reference to be anticipatory, the reference must exactly describe the claimed invention. Because the Vincent reference does not describe at the very least, a refiner, the reference is not anticipatory. Furthermore, the Vincent reference does not teach or remotely suggest the invention that is defined by Claim 1. Claims 2, 4, 5, 8, 10, and 16-21 are dependent from Claim 1. Accordingly, applicants respectfully request withdrawal of the rejection of Claims 1, 2, 4, 5, 8, 10, and 16-21.

The Rejection of Claims 1, 2, 4, 5, 8, 10, and 16-21 Under 35 U.S.C. § 102(b)

Claims 1, 2, 4, 5, 8, 10, and 16-21 are rejected under 35 U.S.C. § 102(b) as being anticipated by Krüger et al. (U.S. Patent No. 4,626,319). Applicants respectfully disagree.

The Krüger reference is directed to a process for the delignification and bleaching of cellulose with oxygen and hydrogen peroxide, wherein the delignification is carried out with oxygen in the presence of MgO, and the cellulose is subsequently bleached simultaneously with hydrogen peroxide. (See the Abstract.)

Claim 1 recites, "introducing a source of magnesium ions and hydroxyl ions to a refiner" and "introducing a source of perhydroxyl ions to said refiner." The Krüger reference makes no mention of a refiner. Contrary to the Examiner's assertion, applicants submit the Krüger reference does not describe a refiner. For a reference to be anticipatory, the reference must exactly describe the claimed invention. Because the Krüger reference does not describe at the very least, a refiner, the reference is not anticipatory. Furthermore, the Krüger et al. reference does not teach or remotely suggest the invention that is defined by Claim 1. Claims 2, 4, 5, 8, 10, and 16-21 depend from Claim 1. Accordingly, withdrawal of the rejection of Claims 1, 2, 4, 5, 8, 10, and 16-21 is respectfully requested.

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The Rejection of Claims 1-27 Under 35 U.S.C. § 103(a)

Claims 1-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Krüger et al. alone or in view of Prough et al. (U.S. Patent No. 4,731,160). Applicants respectfully disagree.

For a *prima facie* case of obviousness, there must first be a suggestion or motivation either in the references or in the knowledge generally available to modify a reference or to combine references, there must be a reasonable expectation of success, and all of the claim elements must be found in the prior art.

As an initial matter, the Examiner appears to have misapprehended the meaning of a refiner. A refiner is not a bleach tower. A refiner is described in the specification at page 6, lines 21-24. The Krüger et al. reference makes no mention of a refiner. The Prough et al. reference is merely describing conventional bleaching with hydrogen peroxide after a refiner. However, according to Claim 1, a source for magnesium ions and hydroxyl ions and a source of perhydroxyl ions are introduced at a refiner. There is no reason to combine the Krüger et al. reference with the Prough et al. reference. Neither the Krüger et al. or the Prough et al. reference describes bleaching taking place in a refiner.

In addition to a lack of any motivation or suggestion to combine or modify the Krüger and Prough references, the references also fail to show all the elements of the claimed invention even if they are combined. Claim 1 recites "introducing a source of magnesium ions and hydroxyl ions to a refiner" and also "introducing a source of perhydroxyl ions to said refiner." The Krüger reference makes no mention of a refiner. The Prough reference describes a primary refiner 11 and a secondary refiner 12. However, the Prough reference does not describe either introducing a source of magnesium ions and hydroxyl ions to a refiner or introducing a source of perhydroxyl ions to a refiner. Accordingly, applicants respectfully request withdrawal of the rejection of Claims 1-27.

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CONCLUSION

In view of the foregoing amendments and remarks, applicants respectfully submit that Claims 1-27 are allowable. If the Examiner has any further questions or comments, the Examiner is invited to contact the applicants' attorney at the number provided below.

Respectfully submitted,

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JOHNSON KINDNESS[PLLC]

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Registration No. 46,649
Direct Dial No. 206.695.1725

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

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AMENDMENTS TO THE DRAWINGS

Replacement Sheet for FIGURE 1

A replacement sheet for FIGURE 1 is being submitted to correct a minor inaccuracy of FIGURE 1. Block 132 shows a double-headed arrow. The arrow head leading to block 132 has been deleted.

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There are other freeness tests that are used around the world. Perhaps the most common one is the *Schopper Reigler* test, which is similar in concept to the CSF test. TAPPI TIS 0809-01 gives inter-conversions of CSF, *Schopper Reigler units*, *Williams Precision*, and *Drainage Factor* for various types of pulp. Fig. 6-5 has two graphical presentations from the first table of TIS 0809. Since the conversions are not exact, the two lines of each set represent the bounds of the conversion. See Section 17.5 for CSF correction equations for temperature and consistency.

6.2 REFINING

Beater

A beater is an early device (the *Hollander Beater* was invented in the 1700s) used to treat pulp to improve the papermaking properties. Beating is a batch process where the pulp slurry circulates through an oval tank around a midsection and passes between a revolving roll with bars and a bedplate with bars. The pulp is at about 6% consistency and emphasizes fiber brushing. The use of these had been phased out at most mills by the late 1970s because they are slow and expensive to operate. Fig. 6-6 shows a Hollander beater that was in use until the mid 1970s. Some mills retain these for use in mixing stock for small paper machines.

Refiners

Refiners are machines that mechanically macerate and/or cut pulp fibers before they are made into paper. There are two principal types: *disk* and *conical refiners*. Disk refiners have superseded the conical refiners for many purposes, as they offer many advantages.

The operation of a *conical refiner* (Fig. 6-7) is similar to the operation of a disk refiners, except for the geometry of the refiners. In conical refiners, the refining surfaces are on a tapered plug. These surfaces consist of a *rotor* that turns against the housing and the *stator*, both of which contain metal bars mounted perpendicularly to rotation. The *Jordan refiner*, patented by Joseph Jordan in 1858, is one type of conical refiner with a 12° angle on the rotor (with respect to the longitudinal axis); it is suited to low consistency refining (2% consistency) with much fiber cutting. The *Claflin* refiner uses a rotor with a 45° angle with respect to the longitudinal axis that revolves

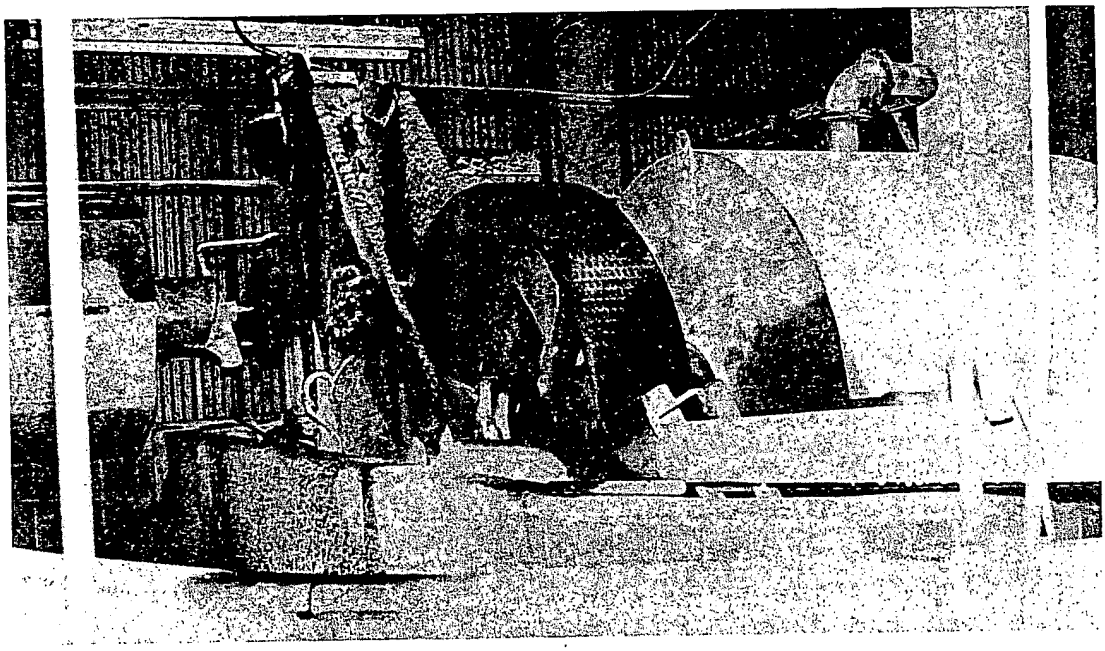

Fig. 6-6. The Hollander beater for mill beating of pulp.

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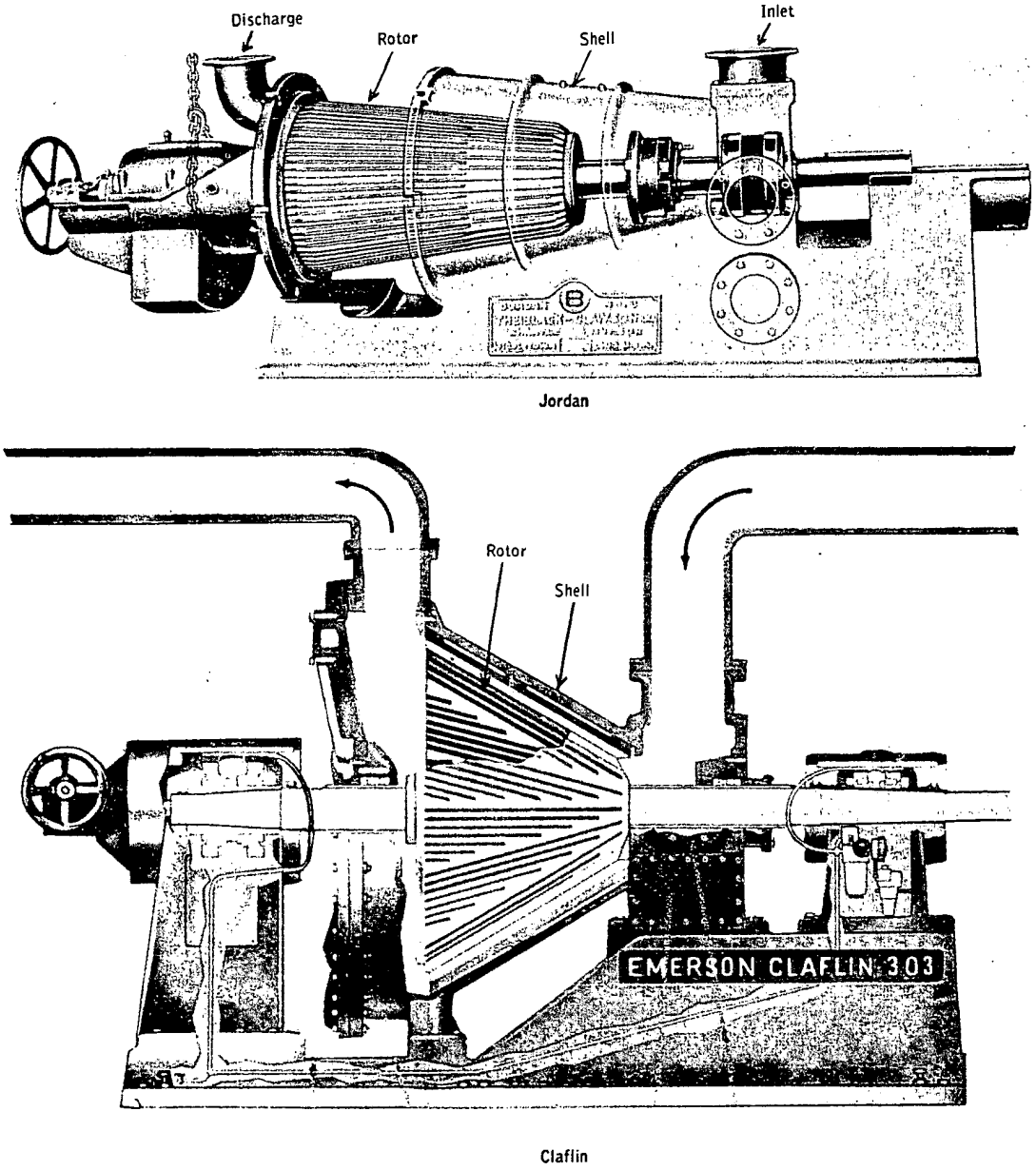

Fig. 6-7. The Jordan and Claflin conical refiners. Reprinted from *Making Pulp and Paper*, ©1967 Crown Zellerbach Corp., with permission.

inside the mating shell. The inlet is at the small end of the taper. The Claflin refiner is intermediate in operation to the Jordan disk refiners. These two refiners are shown in Fig. 6-7.

Disk refiners became available for papermaking in the 1930s, after the conical refiners. Disk refiners had enjoyed widespread use in food processing. For example, they are used to process peanuts into peanut butter and corn into cornstarch and flour. The pulp slurry makes one pass between rotating plates equipped with teeth or bars. There are three common configurations: one fixed plate with one rotating plate (Fig. 6-8), two rotating plates that turn in opposite directions,

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or a set of two pairs of plates formed by a double sided rotating disk between two stationary plates (Plate 23.)

Disk refiners are able to operate at high consistency, which favors fiber fibrillation with minimal fiber cutting. They have lower no-load energy requirements (an indication of energy that does not contribute to refining), are more compact, and are easier to maintain. Disk refiners are also used for production of mechanical pulp from wood chips. *Tackle* (the plates) is easily replaced; a wide variety of tackle metals (Table 6-1) and designs (Fig. 6-9) exist for pulping and refining.

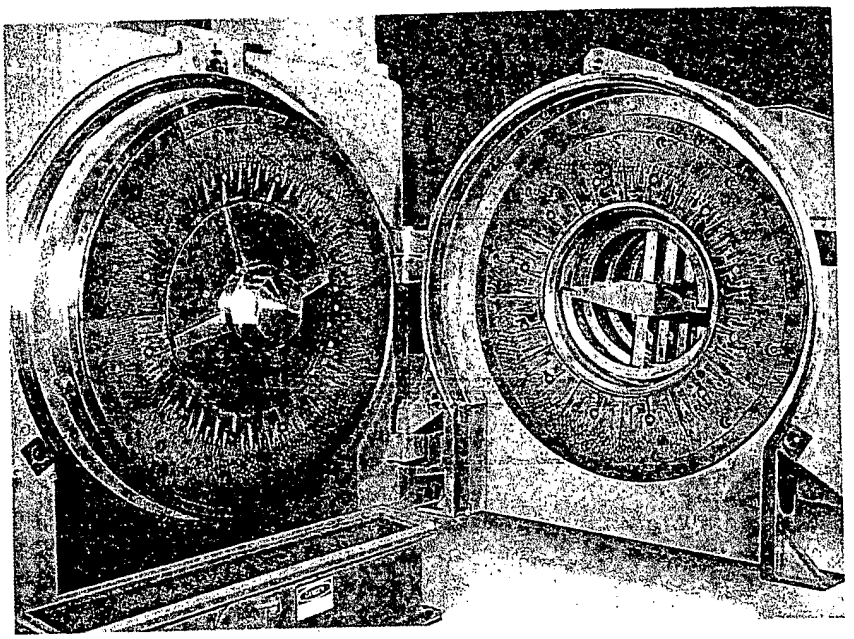

Fig. 6-8. Single-disk refiner (notice the plate segments). The ribbon feeder (for pulping or high consistency refining) is observed through the right disk. Courtesy of Andritz Sprout-Bauer.

It is interesting to consider the historical development of beating and refining in terms of the angle of the bars with respect to the axis of rotation. The Hollander beater has an angle of 0°, the early conical refiners have 12° angles, the Claflin refiner has a 45° angle, and disk refiners have 90° angles. Generally, the higher the angle, the higher the consistency at which refining can occur, leading to lower fiber cutting.

Table 6-1. Typical industry refiner plate metallurgies. Courtesy of Andritz Sprout-Bauer.

Metallurgy	Hardness (Rc)	Corrosion Resistance	Abrasion Resistance	Impact Resistance	Elongation	Fluidity	Cost
Ni–Hard White Iron	55–62	> Carbon and < SS	Good	Extremely brittle	None	Good	1 X
X–C (Hi–C) White Iron	50–55	Lower than SS	Good	Brittle	None	Fair	1.5 X
MCK & K–Alloys White Iron	50–55	> Ni–Hard < Hi–C	Good	> Ni–Hard & X–C	None	Fair	1.5 X
440–C High–Carbon Stainless Steel	55–60	Better than white iron	Less than white iron	Tougher than white iron	1%–2%	Poor	3 X
SA1 High–Carbon Stainless Steel	50–55	Same as 440–C	Same as 440–C	Same as 440–C	1%–2%	Poor	3 X
17–4 PH Stainless Steel (SS)	32–40	Excellent	Less than others	Best resistance of all	10%–15%	Very poor	4 X

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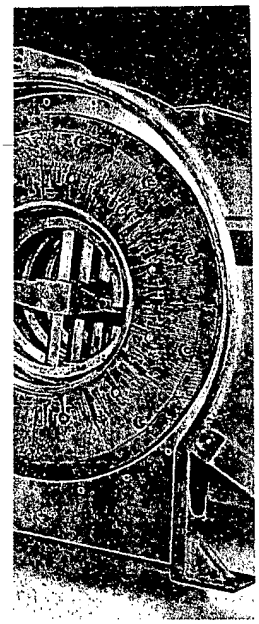

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-	Fluidity	Cost
	Good	1 X
	Fair	1.5 X
	Fair	1.5 X
%	Poor	3 X
%	Poor	3 X
	Very poor	4 X

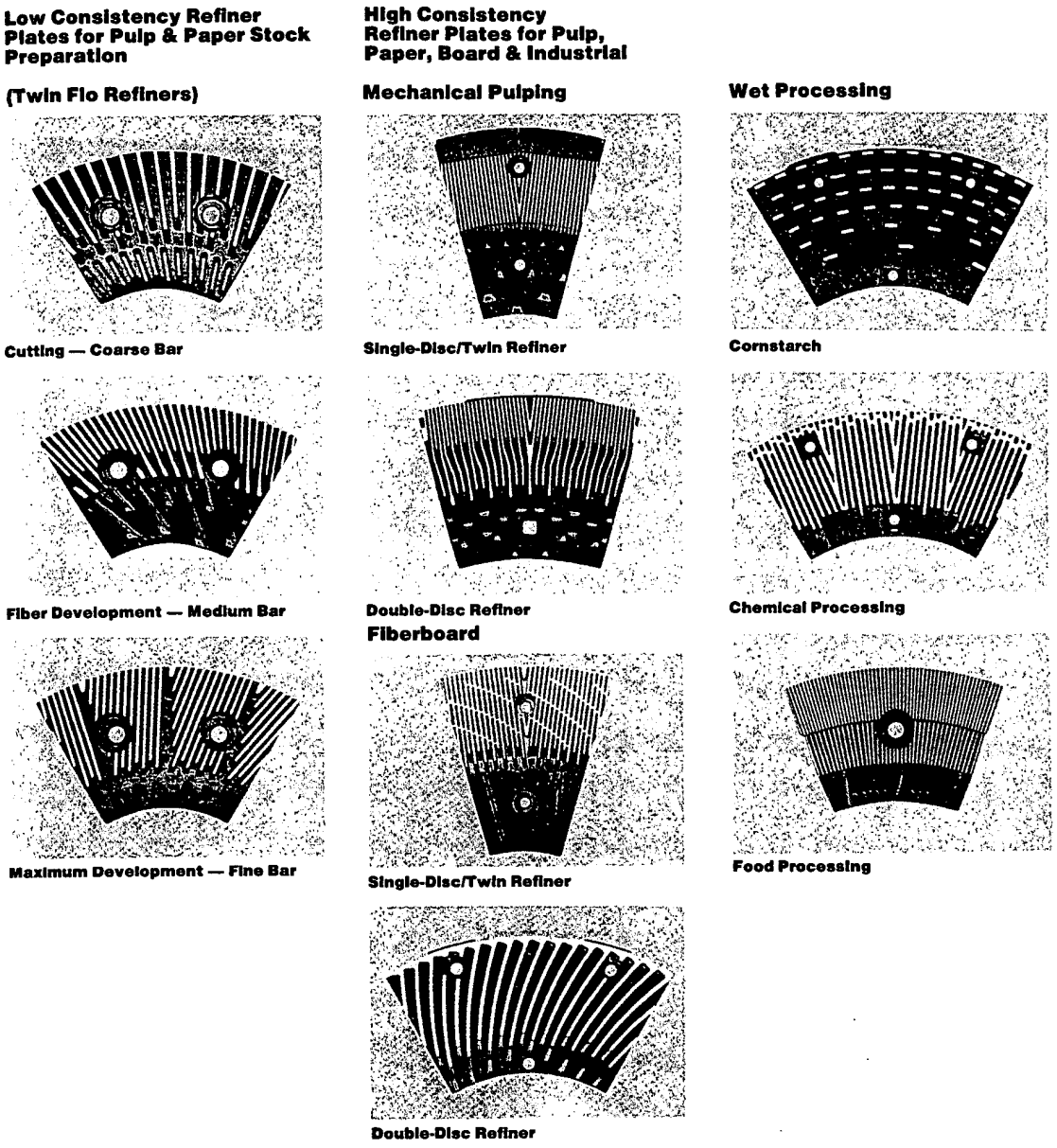

Fig. 6-9. Representative refiner plate designs. Courtesy of Andritz Sprout-Bauer.

Disk refiner plates

Calderon, Sharpe, and Rodarmel (1987) provide an informative summary of low consistency refining for fiber approach or hot stock refining. The consistency should be 3.5-5%; consistencies below 2.5% causes undue wear and short plate life. Fibrillation (separation of the S-1 cell wall layer) occurs at the bar edge, so more, narrow bars means higher fibrillation. Smaller volume in the groves promotes refining action, but decreases the volume that flows through the refiner. Increasing the bar angle increases refining, but also increases the refining power required. *Dams* are used to inhibit channeling of the pulp, but are not required at low consistencies with the proper selection of the plate pattern. Fig. 6-10 shows the effect of many refining variables on the refining process.